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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/791,527	SAEY, DIMITRI	
	Examiner	Art Unit	
	SIU M. LEE	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 September 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7-11,14-16,19-23 and 26-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-11,14-16,19-23 and 26-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 9/18/2009 have been fully considered but they are not persuasive.

Applicant's argument:

Peeters merely provides the carriers in the subsets are given a numerical index value solely for identification purposes, the lowest index in subsets does not represent a carrier group parameters being a worst case parameter of the plurality of carriers within the at least one dynamically variable size carrier group.

Examiner's response:

It is well known in the art that the bit allocation for each sub-carrier depends on the signal to noise ratio for each sub-carrier (as discloses in Peeters (US 2001/0012783 A1), paragraph 0019); when the signal to noise of a sub-carrier is high, more bit can be carry. Peeters discloses a system that the receiver measures the signal to noise ratio for each sub-carrier and based on the measured signal to noise ratio, the bit allocation of each sub-carrier is determined. The sub-carriers are divided in 8 subsets and sub-carriers in each subset are being assign the same bit allocation (constant interpolation) as shown in figure 1; i.e. each sub-carrier in subset 1 as shown in figure 1 carries 2 bits; and each sub-carrier in subset 2 carries 4 bits (paragraph 0019). As each subset of sub-carriers carries a different number of bits, it is inherent that there is one subset that carries the least number of bits. The subset of carriers that carry the least number of

bit comprises sub-carriers that have a lowest signal to noise ratio within all sub-carriers therefore can only have a lower bit allocation. The examiner interprets the subgroup of sub-carriers that carry the least number of bit is the group with the lowest signal to noise ratio, that is the worst case signal to noise ratio and the bit allocation parameter is the worst case parameter of the plurality of carriers within the at least one dynamically variable size carrier group.

Claim Objections

2. Claim 1 is objected to because of the following informalities:

Claim 1, lines 4-5 recites "a carriergroup receiving means configured **to to** receive parameters relating to a plurality of carriers", the examiner suggest removing the extra "**to**".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 8-11, 14, and 30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter

which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 8 recites “sending at least one message using the tone decoder, the at least one message including the plurality if carriergroup parameters". According to paragraph 0034 and 0041 of the instant application, the step 360 (figure 3) or step 460 (figure 4) are using the carriergroup parameters to set up the tone-decoder in the near end modem and the tone encoder in the far end modem. The examiner assumes the tone decoder in the near end modem is the receiver, and the tone encoder in the far end modem is the transmitter. However, the specification of the instant application does not discloses how to using a tone decoder to send one message including the plurality of carriergroup parameter and it is not well known to use a decoder for transmission.

6. Claims 15-16, 19, and 27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 15 recites “using the carriergroup bitloading and the carriergroup gain to dynamically set up a tone encoder in the near end modem”; according to the paragraph 0034, and 0041; steps 360 of figure 3 and step 460 of figure 4, "the carriergroup parameters are transmitted to the far end modem to enable the far end modem to

appropriately configure its tone encoder for transmitting messages using the carrier groups and the carriergroup parameters. Therefore, there is no teaching in the instant application for using the carriergroup bitloading and the carriergroup gain to dynamically set up a tone encoder in the near end modem.

7. Claims 20-23, 26, and 31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 20, lines 15-16 recites "a tone encoder coupled to the transmission channel configured to transmit the message, the tone decoder being dynamically set up based on the plurality of carriergroup parameters". There is no antecedent basis for "the tone decoder" and it is unclear the how the carriergroup transmitter means including a tone decoder.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 4, 7-8, 11, 14-16, 19-20, 26, and 28-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Peeters et al. (US 2001/0012783 A1, hereafter Peeters).

(1) Regarding claim 1:

Peeters discloses a modem, comprising:

a carriergroup receiving means (DMOD in figure 1) configured to receive parameters relating to a plurality of carriers (the transmitter TX in figure 1 transmit a predetermined sequence to receiver RX and is received by the DMT demodulator DMOD and the DMOD receives a constellation information from constellation information producer BiGi_PROD in the control input of the DMT demodulator DMOD, paragraph 0018-0019);

a carriergrouping means (channel analyzing circuitry CHANNEL and constellation information producer BiGi_PROD of Rx modem in figure 1) configured to determine a plurality of carriergroup parameters (constellation information message that contains the bit loading information and the gain information, paragraph 0019, lines 13-16) and at least one dynamically variable size carrier group for the plurality of carriers based on the parameters (channel analyzing circuitry CHANNEL receives a predetermined sequence from the TX modem and measures the signal to noise ratio for each carrier, paragraph 0019, lines 4-7; paragraph 0021 states that the carrier subsets of carriers typically will not contain the same number of carriers and the constitution of the subsets will be report via messages (possibly via the constellation information message BiGi) from the VDSL receiver to the VDSL transmitter; this paragraph indicates that the number of carriers in a carrier subset is not fixed and will varies according to the measured signal to noise ratio by CHANNEL as mentioned in paragraph 0019; paragraph 0023 states "the transmitting and computing bits and gains information according to the present invention may be applied during operation to adapt

the carrier constellation according to changes of the channel characteristics"; the carrier constellation as mentioned in paragraph 0005, "this message also may contain the description of the carrier subsets". This indicates that the generation of the constellation information (including the description of the carrier subsets, the number of bits to be load in each carrier subset and the gain for each of the carrier subset) can be preformed during the operation to adapt to the changes of the channel characteristics, that will include the measure of the signal to noise ratio for each carrier in order to group the carriers into difference carrier subsets. Since it is well known that the channel characteristic is dynamically changing, therefore, the update of the constellation information will be perform according to the change of the channel characteristic, that is the dynamically updating of the constellation information. From this two paragraphs (paragraph 0021 and 0023), it is inherent that he grouping of the carriers and transmitting parameters to other modems are perform dynamically and the size of each carrier subset will varies depending on the signal to noise ratio of each carrier), at least one of the plurality of carriergroup parameters being a worst case parameter of the plurality of carriers within the at least one dynamically variable size carrier group (figure 1 shows that the sub-carriers are divided in subsets and the sub-carriers in a subset carries the same number of bits, i.e. each sub-carrier in subset 1 as shown in figure 1 carries 2 bits; and each sub-carrier in subset 2 carries 4 bits (paragraph 0019). As each subset of sub-carriers carries a different number of bits, it is inherently that there is one subset that carries the least number of bits. The subset of carriers that carry the least number of bits comprises sub-carriers that have a lowest signal to noise ratio within all

sub-carriers therefore can only have a lower bit allocation. The examiner interprets the subgroup of sub-carriers that carry the least number of bits is the group with the lowest signal to noise ratio, that is the worst case signal to noise ratio and lowest bit allocation parameter; therefor, it is the worst case parameter of the plurality of carriers within the at least one dynamically variable size carrier group); and

a carriergroup transmitting means (BiGi_TX of RX modem in figure 1) configured to transmit at least one message including the plurality of carriergroup parameters and the at least one dynamically variable size carrier group (constellation information transmitting arrangement BiGi_TA transmit the constellation information message BiGi from the constellation information transmitter BiGi_TX (of modem RX) to the constellation information receiver BiGi_RX (of modem TX) as shown in figure 1, paragraph 0018).

(2) Regarding claims 4, 11, and 23:

Peeters discloses wherein at lest one of the carriergroup parameter is a carrier group bitloading parameter comprises a carriergroup bitloading parameter (the set of parameter value for a carrier subset may consist of a bit number, carrier belonging to the same subset will be modulated with an equal amount of bits, paragraph 0008) for the at least one dynamically variable size carrier group (constellation information message that contains the bit loading information and the gain information, paragraph 0019, lines 13-16) and at least one dynamically variable size carrier group for the plurality of carriers based on the parameters (channel analyzing circuitry CHANNEL receives a predetermined sequence from the TX modem and measures the signal to

noise ratio for each carrier, paragraph 0019, lines 4-7; paragraph 0021 states that the carrier subsets of carriers typically will not contain the same number of carriers and the constitution of the subsets will be report via messages (possibly via the constellation information message BiGi) from the VDSL receiver to the VDSL transmitter; this paragraph indicates that the number of carriers in a carrier subset is not fixed and will varies according to the measured signal to noise ratio by CHANNEL as mentioned in paragraph 0019; paragraph 0023 states "the transmitting and computing bits and gains information according to the present invention may be applied during operation to adapt the carrier constellation according to changes of the channel characteristics"; the carrier constellation as mentioned in paragraph 0005, "this message also may contain the description of the carrier subsets". This indicates that the generation of the constellation information (including the description of the carrier subsets, the number of bits to be load in each carrier subset and the gain for each of the carrier subset) can be preformed during the operation to adapt to the changes of the channel characteristics, that will include the measure of the signal to noise ratio for each carrier in order to group the carriers into difference carrier subsets. Since it is well known that the channel characteristic is dynamically changing, therefore, the update of the constellation information will be perform according to the change of the channel characteristic, that is the dynamically updating of the constellation information. From this two paragraphs (paragraph 0021 and 0023), it is inherent that he grouping of the carriers and transmitting parameters to other modems are perform dynamically and the size of each carrier subset will varies depending on the signal to noise ratio of each carrier).

(3) Regarding claims 7, 14, and 26:

Peeters discloses means (constellation determining circuitry BiGi_DET) for using at least one message to set up a tone encoder (MOD) in a far-end modem (TX modem) (the constellation information receiver BiGi_RX decapsulates the constellation information message and supplies the parameter values B1, G1, B2, G2, . . . , B8, G8 to the constellation determining circuitry BiGi_DET; for each subset, SUBSET1, SUBSET2, . . . , SUBSET8, the constellation determining circuitry BiGi_DET obtain for each carrier the number of bits that should be modulated thereon. Similarly, the constellation determining circuitry BiGi_DET constantly interpolates for each subset, SUBSET1, SUBSET2, . . . , SUBSET8, the received gain value, G1, G2, . . . , G8 respectively, to obtain for each carrier the gain with which the carrier should be transmitted. The so generated bits and gains information is supplied to the control input of the DMT modulator MOD, paragraph 0019).

(4) Regarding claims 28, 30, and 31:

Peeters discloses wherein the plurality of carriergroup parameter comprises a carriergroup gain parameter (the so obtained 8 bit values B1..B8 and 8 gain values G1..G8 are encapsulated in the constellation information message BiGi by the constellation information transmitter BiGi_TX, paragraph 0019).

(5) Regarding claim 29:

Peeters discloses setting up a tone encoder using the plurality of carriergroup parameter (the examiner interprets the tone encoder is in the modem TX in figure 1) (the constellation information receiver BiGi_RX decapsulates the constellation

information message and supplies the parameter values B1, G1, B2, G2, . . . , B8, G8 to the constellation determining circuitry BiGi_DET; for each subset, SUBSET1, SUBSET2, . . . , SUBSET8, the constellation determining circuitry BiGi_DET obtain for each carrier the number of bits that should be modulated thereon. Similarly, the constellation determining circuitry BiGi_DET constantly interpolates for each subset, SUBSET1, SUBSET2, . . . , SUBSET8, the received gain value, G1, G2, . . . , G8 respectively, to obtain for each carrier the gain with which the carrier should be transmitted. The so generated bits and gains information is supplied to the control input of the DMT modulator MOD, paragraph 0019).

(6) Regarding claim 8 (claim 8 is rejected based on the assumption that the sending of the at least one message including the plurality of carriergroup parameter is not using the tone decoder):

Peeters discloses a method for grouping a plurality of carriers in a DMT communication system, comprising

determining at least one dynamically variable sized carrier group for the plurality of carriers used for communication in the DMT communication system (after channel analysis, the carriers are grouped in subset of carriers, paragraph 0021, lines 3-6) (paragraph 0021 states that the carrier subsets of carriers typically will not contain the same number of carriers and the constitution of the subsets will be report via messages (possibly via the constellation information message BiGi) from the VDSL receiver to the VDSL transmitter, it indicates that the number of carriers in a carrier subset is not fixed and will varies according to the measured signal to noise ratio as mentioned in

paragraph 0019. Paragraph 0023 states "the transmitting and computing bits and gains information according to the present invention may be applied during operation to adapt the carrier constellation according to changes of the channel characteristics. The carrier constellation as mentioned in paragraph 0005, "this message also may contain the description of the carrier subsets", it indicates that the generation of the constellation (information including the description of the carrier subsets, the number of bits to be load in each carrier subset and the gain for each of the carrier subset) can be preformed during the operation to adapt to the changes of the channel characteristics, that will include the measure of the signal to noise ratio for each carrier in order to group the carriers into difference carrier subsets. It is well known in the art that a channel characteristic is always changing, the update of the constellation information will be perform according to the change of the channel characteristic, that is the dynamically updating of the constellation information. From paragraph 0021 and 0023, it is inherent that the grouping of the carriers and transmitting parameters to other modems are perform dynamically and the size of each carrier subset will varies depending on the signal to noise ratio of each carrier);

determining a plurality of carriergroup parameters for the at least one dynamically variable sized carrier group (the CHANNEL and BiGi_PROD determine the carriergroup information that includes at least the number of bit for each carrier subset and the gain for each carrier subset, paragraph 0019), at least one of the plurality of carriergroup parameters being a worst case parameter of the plurality of carriers within the at least one dynamically variable size carrier group (figure 1 shows that the sub-carriers are

divided in subsets and the sub-carriers in a subset carries the same number of bits, i.e. each sub-carrier in subset 1 as shown in figure 1 carries 2 bits; and each sub-carrier in subset 2 carries 4 bits (paragraph 0019). As each subset of sub-carriers carries a different number of bits, it is inherently that there is one subset that carries the least number of bits. The subset of carriers that carry the least number of bits comprises sub-carriers that have a lowest signal to noise ratio within all sub-carriers therefore can only have a lower bit allocation. The examiner interprets the subgroup of sub-carriers that carry the least number of bits is the group with the lowest signal to noise ratio, that is the worst case signal to noise ratio and lowest bit allocation parameter; therefor, it is the worst case parameter of the plurality of carriers within the at least one dynamically variable size carrier group);

using the plurality of carriergroup parameters to dynamically set up a tone decoder (DMOD of modem receiver RX in figure 1) (DMOD receives a constellation information from constellation information producer BiGi_PROD in the control input of the DMT demodulator DMOD, paragraph 0018); and

sending at least one message, the at least one message including the plurality of carriergroup parameters (constellation information transmitting arrangement BiGi_TA transmit the constellation information message BiGi from the constellation information transmitter BiGi_TX (of modem RX) to the constellation information receiver BiGi_RX (of modem TX) as shown in figure 1, paragraph 0018).

(7) Regarding claim 15 (claim 15 is rejected based on the assumption that the near end communication system is the transmitting modem and the far end modem is the receiving modem):

Peeters discloses a method of grouping a plurality of carriers in a DMT communication system, the DMT communication system including a near end (TX modem in figure 1) and a far end modem (RX modem in figure 1), comprising:

determining at least one dynamically variable sized carrier group from the plurality of carriers used for communication in the DMT communication system (channel analyzing circuitry CHANNEL receives a predetermined sequence from the TX modem and measures the signal to noise ratio for each carrier, paragraph 0019, lines 4-7; paragraph 0021 states that the carrier subsets of carriers typically will not contain the same number of carriers and the constitution of the subsets will be report via messages (possibly via the constellation information message BiGi) from the VDSL receiver to the VDSL transmitter; this paragraph indicates that the number of carriers in a carrier subset is not fixed and will varies according to the measured signal to noise ratio by CHANNEL as mentioned in paragraph 0019; paragraph 0023 states "the transmitting and computing bits and gains information according to the present invention may be applied during operation to adapt the carrier constellation according to changes of the channel characteristics"; the carrier constellation as mentioned in paragraph 0005, "this message also may contain the description of the carrier subsets". This indicates that the generation of the constellation information (including the description of the carrier subsets, the number of bits to be load in each carrier subset and the gain for each of the

carrier subset) can be preformed during the operation to adapt to the changes of the channel characteristics, that will include the measure of the signal to noise ratio for each carrier in order to group the carriers into difference carrier subsets. Since it is well known that the channel characteristic is dynamically changing, therefore, the update of the constellation information will be perform according to the change of the channel characteristic, that is the dynamically updating of the constellation information. From this two paragraphs (paragraph 0021 and 0023), it is inherent that he grouping of the carriers and transmitting parameters to other modems are perform dynamically and the size of each carrier subset will varies depending on the signal to noise ratio of each carrier);

determining a carriergroup signal-to-noise ratio (SNR) for the at least one dynamically variable sized carrier group (the channel analyzing circuitry CHANNEL upon transmission of a predetermined sequence measures the signal-to-noise ratio (SNR) for each carrier f_0 to f_{4095}, paragraph 0019, lines 4-13);

determining a carriergroup bitloading and a carriergroup gain for the at least one dynamically variable sized carrier group based on the carriergroup SNR (this signal-to-noise ratio values are used by the constellation information producer to determine for each carrier subset, SUBSET1 to SUBSET8 the number of bits that can be modulated on each carrier of this subset and the gain where each carrier of this subset should be transmitted with, paragraph 0019, lines 8-13);

using the carriergroup bitloading and the carriergroup gain to dynamically set up a tone encoder in the near end modem (MOD in figure 1) in the near end modem (the

constellation information receiver BiGi_RX decapsulates the constellation information message and supplies the parameter values B1, G1, B2, G2, . . . , B8, G8 to the constellation determining circuitry BiGi_DET; for each subset, SUBSET1, SUBSET2, . . . , SUBSET8, the constellation determining circuitry BiGi_DET obtain for each carrier the number of bits that should be modulated thereon. Similarly, the constellation determining circuitry BiGi_DET constantly interpolates for each subset, SUBSET1, SUBSET2, ...SUBSET8, the received gain value, G1, G2,....,G8 respectively, to obtain for each carrier the gain with which the carrier should be transmitted. The so generated bits and gains information is supplied to the control input of the DMT modulator MOD, paragraph 0019); and

using the carriergroup bitloading and the carriergroup gain to transmit messages from the near end modem to the far end modem using the tone encoder (the MOD is being setup for modulates B1 bits (B1 is supposed to be 2 in Fig.) on the carriers f.sub.0 . . . f.sub.511 of SUBSET1 and transmits these carriers with gain G1, modulates B2 bits (B2 is supposed to be 4 in Fig.) on the carriers f.sub.512 . . . f.sub.1023 of SUBSET2 and transmits these carriers with gain G2, . . . , modulates B8 bits (B8 is supposed to be 3 in Fig.) on the carriers f.sub.3584 . . . f.sub.4095 of SUBSET8 and transmits these carriers with gain G8 as shown in figure 1, paragraph 0019).

(8) Regarding claim 16:

Peeters further discloses wherein the carriergroup SNR comprises a worst case SNR of the plurality of carriers within the art least one dynamically variable size carrier group (figure 1 shows that the sub-carriers are divided in subsets and the sub-carriers in

a subset carries the same number of bits, i.e. each sub-carrier in subset 1 as shown in figure 1 carries 2 bits; and each sub-carrier in subset 2 carries 4 bits (paragraph 0019). As each subset of sub-carriers carries a different number of bits, it is inherently that there is one subset that carries the least number of bits. The subset of carriers that carry the least number of bits comprises sub-carriers that have a lowest signal to noise ratio within all sub-carriers therefore can only have a lower bit allocation. The examiner interprets the subgroup of sub-carriers that carry the least number of bits is the group with the lowest signal to noise ratio, that is the worst case signal to noise ratio and lowest bit allocation parameter; therefor, it is the worst case parameter of the plurality of carriers within the at least one dynamically variable size carrier group).

(9) Regarding claim 19:

Peeters et al. discloses a method wherein the communication system is VDSL system (paragraph 0019, lines 1-2).

(10) Regarding claim 20 (claim 20 is rejected based on interpretation that the tone decoder as the tone encoder):

Peeters discloses a modem for grouping a plurality of carriers in a DMT communication system coupled to a far-end modem via a transmission channel (figure 1, the Rx modem and the TX modem), comprising:

carriergrouping means (channel analyzing circuitry (CHANNEL) and the BiGi_PROD in the RX modem in figure 1, paragraph 0019, lines 5) configured to determine multiple dynamically variable sized carrier groups for the plurality of carriers and to determine a plurality of carriergroup parameters for each of the multiple carrier

groups (channel analyzing circuitry CHANNEL receives a predetermined sequence from the TX modem and measures the signal to noise ratio for each carrier, paragraph 0019, lines 4-7; paragraph 0021 states that the carrier subsets of carriers typically will not contain the same number of carriers and the constitution of the subsets will be report via messages (possibly via the constellation information message BiGi) from the VDSL receiver to the VDSL transmitter; this paragraph indicates that the number of carriers in a carrier subset is not fixed and will varies according to the measured signal to noise ratio by CHANNEL as mentioned in paragraph 0019; paragraph 0023 states "the transmitting and computing bits and gains information according to the present invention may be applied during operation to adapt the carrier constellation according to changes of the channel characteristics"; the carrier constellation as mentioned in paragraph 0005, "this message also may contain the description of the carrier subsets". This indicates that the generation of the constellation information (including the description of the carrier subsets, the number of bits to be load in each carrier subset and the gain for each of the carrier subset) can be preformed during the operation to adapt to the changes of the channel characteristics, that will include the measure of the signal to noise ratio for each carrier in order to group the carriers into difference carrier subsets. Since it is well known that the channel characteristic is dynamically changing, therefore, the update of the constellation information will be perform according to the change of the channel characteristic, that is the dynamically updating of the constellation information. From this two paragraphs (paragraph 0021 and 0023), it is inherent that he grouping of the carriers and transmitting parameters to other modems are perform

dynamically and the size of each carrier subset will varies depending on the signal to noise ratio of each carrier) at least one of the plurality of carriergroup parameters being a worst case parameter of the plurality of carriers within each of the multiple carrier groups (figure 1 shows that the sub-carriers are divided in subsets and the sub-carriers in a subset carries the same number of bits, i.e. each sub-carrier in subset 1 as shown in figure 1 carries 2 bits; and each sub-carrier in subset 2 carries 4 bits (paragraph 0019). As each subset of sub-carriers carries a different number of bits, it is inherently that there is one subset that carries the least number of bits. The subset of carriers that carry the least number of bits comprises sub-carriers that have a lowest signal to noise ratio within all sub-carriers therefore can only have a lower bit allocation. The examiner interprets the subgroup of sub-carriers that carry the least number of bits is the group with the lowest signal to noise ratio, that is the worst case signal to noise ratio and lowest bit allocation parameter; therefor, it is the worst case parameter of the plurality of carriers within the at least one dynamically variable size carrier group); and

carriergroup transmitting means (BiGi TA of Rx modem in figure 1) configured to transmit messages including the plurality of carriergroup parameters (constellation information) to the far-end modem (TX modem in figure 1) via the transmission channel (LINE in figure 1) to enable the far-end modem to send and receive messages using the multiple carrier groups (the constellation information receiver BiGi_RX decapsulates the constellation information message and supplies the parameter values B1, G1, B2, G2, . . . , B8, G8 to the constellation determining circuitry BiGi_DET; for each subset, SUBSET1, SUBSET2, . . . , SUBSET8, the constellation determining circuitry BiGi_DET

obtain for each carrier the number of bits that should be modulated thereon. Similarly, the constellation determining circuitry BiGi_DET constantly interpolates for each subset, SUBSET1, SUBSET2, . . . , SUBSET8, the received gain value, G1, G2, . . . , G8 respectively, to obtain for each carrier the gain with which the carrier should be transmitted. The so generated bits and gains information is supplied to the control input of the DMT modulator MOD, paragraph 0019; the MOD is being setup for modulates B1 bits (B1 is supposed to be 2 in Fig.) on the carriers f.sub.0 . . . f.sub.511 of SUBSET1 and transmits these carriers with gain G1, modulates B2 bits (B2 is supposed to be 4 in Fig.) on the carriers f.sub.512 . . . f.sub.1023 of SUBSET2 and transmits these carriers with gain G2, . . . , modulates B8 bits (B8 is supposed to be 3 in Fig.) on the carriers f.sub.3584 . . . f.sub.4095 of SUBSET8 and transmits these carriers with gain G8 as shown in figure 1, paragraph 0019), the group carriergroup transmitting means including:

a tone encoder (BiGi_TX in receiving modem RX) coupled to the transmission channel (LINE) configured to transmit the messages (constellation information transmitter BiGi_TX transmit the constellation information BiGi to the TX modem), the tone encoder being dynamically set up based upon the plurality of carriergroup parameters (since the channel is dynamically changing, the constellation information is dynamically changing depending on the channel characteristic (as explain in above), therefore the constellation information send from the BiGi_TX is dynamically set according to the information from BiGi_PROD, paragraph 0018, the examiner interprets the limitation “the tone encoder being dynamically set up based on the plurality of

carriergroup parameter" as the constellation information from the BiGi_PROD configured the output of the BiGi_TX).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 2-3, 9-10, and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peeters et al. (US 2001/0012783 A1).

(1) Regarding claim 2:

Peeters discloses all the subject matter except wherein at least one of the plurality of carriergroup parameter comprises a carriergroup signal to noise ratio (SNR) parameter for the at least one dynamically variable size carriergroup.

However, Peeters et al. discloses wherein the at least one carriergroup parameter transmitted by the carriergroup transmitting means is a bit loading number for the carriergroup for the plurality of carriergroup (paragraph 0020, lines 3-8) and the bit loading information is obtained by the signal to noise ratio of the corresponding carrier, paragraph 0019; and the carriergroup is dynamically variable size (paragraph 0021 states that the carrier subsets of carriers typically will not contain the same number of carriers and the constitution of the subsets will be report via messages (possibly via the constellation information message BiGi) from the VDSL receiver to the VDSL

transmitter; this paragraph indicates that the number of carriers in a carrier subset is not fixed and will varies according to the measured signal to noise ratio by CHANNEL as mentioned in paragraph 0019; paragraph 0023 states "the transmitting and computing bits and gains information according to the present invention may be applied during operation to adapt the carrier constellation according to changes of the channel characteristics"; the carrier constellation as mentioned in paragraph 0005, "this message also may contain the description of the carrier subsets". This indicates that the generation of the constellation information (including the description of the carrier subsets, the number of bits to be load in each carrier subset and the gain for each of the carrier subset) can be preformed during the operation to adapt to the changes of the channel characteristics, that will include the measure of the signal to noise ratio for each carrier in order to group the carriers into difference carrier subsets. Since it is well known that the channel characteristic is dynamically changing, therefore, the update of the constellation information will be perform according to the change of the channel characteristic, that is the dynamically updating of the constellation information. From this two paragraphs (paragraph 0021 and 0023), it is inherent that he grouping of the carriers and transmitting parameters to other modems are perform dynamically and the size of each carrier subset will varies depending on the signal to noise ratio of each carrier).

It would have been obvious to one of ordinary skill in the art at the time of invention to realize that the bit loading for a carrier is proportional to the signal-to-noise ratio; with a high SNR, the carrier can transmit more bits; therefore the bit loading

information for a carriergroup is another form of representation of the signal-to noise ratio. In the instant application, the far end modem receives the transmitted SNR parameter and uses the SNR for determining the bit loading information for the carrier group. Peeters et al. discloses that the near end modem used the measured SNR to determine the bit loading information and then transmitted the bit loading information to the far end modem. Therefore, it would have a matter if obvious design choice to one of ordinary skill in the art and provide the advantage of faster setup time in the far end modem.

(2) Regarding claims 3, 10:

Peeters discloses in figure 1 that the sub-carriers are divided in subsets and the sub-carriers in a subset carries the same number of bits, i.e. each sub-carrier in subset 1 as shown in figure 1 carries 2 bits; and each sub-carrier in subset 2 carries 4 bits (paragraph 0019). As each subset of sub-carriers carries a different number of bits, it is inherently that there is one subset that carries the least number of bits. The subset of carriers that carry the least number of bits comprises sub-carriers that have a lowest signal to noise ratio within all sub-carriers therefore can only have a lower bit allocation. The examiner interprets the subgroup of sub-carriers that carry the least number of bits is the group with the lowest signal to noise ratio, that is the worst case signal to noise ratio and lowest bit allocation parameter; therefor, it is the worst case parameter of the plurality of carriers within the at least one dynamically variable size carrier group.

Peeters does not disclose the worst case parameter comprises a worst case signal to noise ratio (SNR).

However, it would have been obvious to one of ordinary skill in the art at the time of invention to realize that the bit loading for a carrier is proportional to the signal-to-noise ratio; with a high SNR, the carrier can transmit more bits; therefore the bit loading information for a carriergroup is another form of representation of the signal-to noise ratio and the carrier subset with the lowest bit allocation represents the worst case signal to noise ratio. In the instant application, the far end modem receives the transmitted worst case SNR parameter and uses the SNR for determining the bit loading information for the carrier group. Peeters et al. discloses that the near end modem used the measured lowest SNR to determine the lowest bit loading information and then transmitted the bit loading information to the far end modem. Therefore, it would have a matter if obvious design choice to one of ordinary skill in the art and provide the advantage of faster setup time in the far end modem.

(3) Regarding claims 9 and 21:

Peeters discloses wherein the step of determining the plurality of carriergroup parameters for the at least one dynamically variable sized carrier group comprises determining a carriergroup bit allocation (in figure 1 that the sub-carriers are divided in subsets and the sub-carriers in a subset carries the same number of bits, i.e. each sub-carrier in subset 1 as shown in figure 1 carries 2 bits; and each sub-carrier in subset 2 carries 4 bits (paragraph 0019). The examiner interprets the bit allocation for different subset of sub-carrier as a representation of the signal to noise ratio since it is well known in the art that the bit allocation is directly proportional the signal to noise ratio.

Peeters does not explicitly disclose wherein the step of determining the plurality of carriergroup parameters for the at least one dynamically variable sized carrier group comprises determining a carriergroup signal to noise ratio (SNR) for the at least one dynamically variable sized carrier group.

However, it would have been obvious to one of ordinary skill in the art at the time of invention to realize that the bit loading for a carrier is proportional to the signal-to-noise ratio; with a high SNR, the carrier can transmit more bits; therefore the bit loading information for a carriergroup is another form of representation of the signal-to noise ratio. Peeters et al. discloses that the near end modem used the measured SNR to determine the bit loading information and then transmitted the bit loading information to the far end modem. Therefore, it would have a matter if obvious design choice to one of ordinary skill in the art and provide the advantage of faster setup time in the far end modem.

(4) Regarding claim 22:

Peeters discloses all subject matter as discussed in claim 20 but fails to explicitly disclose wherein the plurality of carriergroup parameters for each of the multiple carrier groups comprises a worst case signal to noise (SNR) for each of the multiple carrier groups.

Peeters discloses grouping the sub-carriers into different groups based on the signal to noise ratio and the number of bits the sub-carrier can carry; each of the subset of sub-carriers are being assign a same number of bits (as shown in figure 1, all sub-carrier in subset 1 carry 2 bits). As the sub-carrier in a subset carry same number of

bits, the number of bits in a subset has to be determine by the sub-carrier with the lowest signal to noise ratio in order to make sure that all the other sub-carriers in he subset can carries the same number of bits. Therefore, the bit allocation of each subset is base on the worst signal to noise ratio within the subset and by sending the bit allocation information in the constellation information is a representation of a worst case signal to noise ratio within the subset.

It would have been obvious to one of ordinary skill in the art at the time of invention to realize that the bit loading for a carrier is proportional to the signal-to-noise ratio; with a high SNR, the carrier can transmit more bits; therefore the bit loading information for a carriergroup is another form of representation of the signal-to noise ratio and the carrier subset with the lowest bit allocation represents the worst case signal to noise ratio. In the instant application, the far end modem receives the transmitted worst case SNR parameter and uses the SNR for determining the bit loading information for the carrier group. Peeters et al. discloses that the near end modem used the measured lowest SNR to determine the lowest bit loading information and then transmitted the bit loading information to the far end modem. Therefore, it would have a matter if obvious design choice to one of ordinary skill in the art and provide the advantage of faster setup time in the far end modem.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wu et al. (US 2002/0172146 A1) disclose MDSL DMT architecture.

Sadri et al. (US 2005/0032514 A1) discloses an apparatus and associated methods to perform intelligent transmit power control with sub carrier puncturing.

Isakson et al. (US 6,366,554 B1) discloses a multi-carrier transmission systems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SIU M. LEE whose telephone number is (571)270-1083. The examiner can normally be reached on Mon-Fri, 7:30-4:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chief Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free)? If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Suit M Lee/
Examiner, Art Unit 2611
12/1/2009

/CHIEH M FAN/

Supervisory Patent Examiner, Art Unit 2611